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THE NATIONAL TOOL AND DIE JOURNAL

TOOLS, DIES, JIGS, FIXTURES, MOULDS, GAGES, MACHINES
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PRECISION SPECIALTIES
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Official Publication
Special Tool, Die & Machine Shop Industry

APRIL
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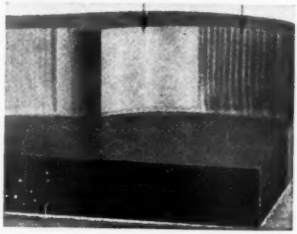

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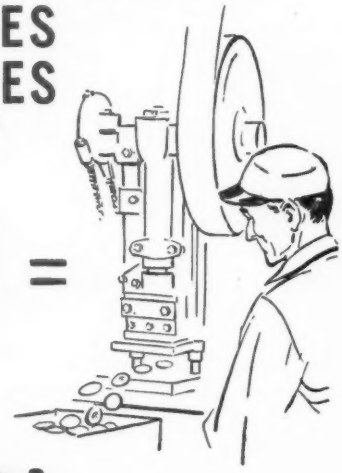

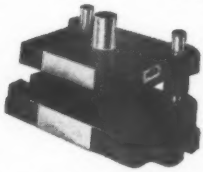

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THE NATIONAL TOOL AND DIE JOURNAL

TOOL·DIE·MACHINE PROGRESS

The National Tool and Die Journal

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George J. Huebner
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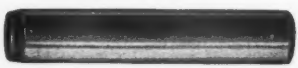

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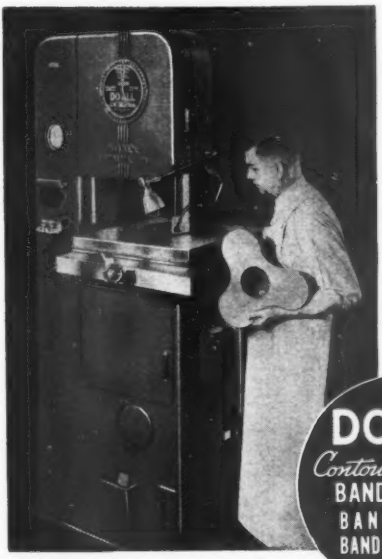

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The National Tool and Die Journal

April, 1939 Vol. 5, No. 1

AN EDITORIAL

Tool Room Holds Key to Production

WHEN Wendell E. Whipp wrote in his article* last month that "the tool room is crying for attention", he stated a fact of vital import to every production manufacturer. He continued: "Of what use our husky, expensive high-production line if a cutting tool or a special tool breaks down? How can our huge presses do their work economically without accurate dies? Of what use the split-haired accuracy in a production machine tool if we cannot give the operator accuracy in cutting and forming tools —in dies, in fixtures and in gages?"

Thousands of tool rooms and contract tool and die shops are attempting to maintain today's requirements of accuracy with machine tools and equipment 10, 20 and even 30 years old. Even if it can be done, it is costly beyond reason.

A tool room superintendent in a large production plant reading Mr. Whipp's words: "Here, in the tool room, where the standard of accuracy is established for the entire plant, where our best work must be done," commented significantly: "In the production department they'll buy a new machine to do an operation more accurately and in less time. It is an expensive, precision-built machine. Then we in the tool room are expected to turn out, on equipment built for the precision of ten years ago, tools and dies which will not fail either in accuracy or in the strain of use on such modern high production machines." It does seem a bit inconsistent.

We recently called on a machine tool builder and were invited to inspect a new model coming through the shop. The works manager was not pleased with the equipment he had to use to turn out his new model.

"See those three lathes?" he asked. We nodded. "They're 16, 18 and 20 years old. Believe me I have to keep my surface grinders in perfect condition to make up for the inaccuracies of those lathes." "What a waste," we said.

The inadequacy of many machine tools in tool rooms and die shops to cope with modern precision requirements is a continual liability to their owners. Modern equipment is needed to meet the demand for lower tooling and production costs.

As Mr. Whipp emphasizes, "The key to production is over in the tool room" and that, of course, is equally true in the contract tool and die shop. It cannot be disputed that replacement of obsolescent machines and accessories in tool rooms and in tool and die shops will bring far-reaching results in better workmanship, increased output and augmented profits.

GEORGE J. HUEBNER

**Article in March Tool·Die·Machine PROGRESS by Wendell E. Whipp, president, National Machine Tool Builders' Assn., president, The Monarch Machine Tool Company.*

The Modern Machine Tool Marches On

By F. O. Hoaglund
Master Mechanic
Pratt & Whitney
Division Niles-Bement-Pond Company

IN the past ten years the development of many essential processes vital to modern industry has been accelerated, made practical and in numerous cases actually created by the machine tool. The machine tool not only has kept up with the needs of modern manufacturing methods, but has anticipated and made them possible. A survey would show how remarkable and important this development has been. But here we will concern ourselves with some of the more important advances made in the design of the machine tool itself—the advances that have helped make the record of the machine tool in industry possible.

Perhaps the most conspicuous advance or departure in machine tools, during the past few years, has been the change from countershafts with step cones and main line drives to individual motor drives.

The old belt drive was very smooth, no doubt, but it had a good many drawbacks. The belts were seldom tight enough to pull properly. They were hard to shift, particularly when the room had high ceilings. As a matter of fact, the largest steps on the countershaft pulleys, giving the highest speed of, say, lathe spindles, were conspicuous by being dirty, showing that they were seldom used—the belt had no slack for throwing it on this step and therefore was hard to shift.

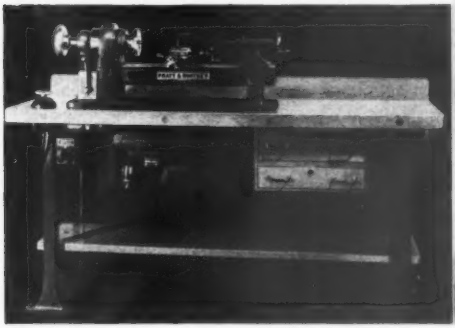
The introduction of main line drives, and of quick change gear heads and gear boxes, was a big step forward.

Endeavors to introduce individual motor drives were received with considerable resistance by tool, die and machine shop supervisors as the first cost was high in comparison with main line drives. The growing demand for clear and clean ceilings did, however, a great deal to break down this resistance, even if it was necessary for a while to place the motor driven countershafts and jackshafts on the top of the machine or under the bench.

Having made the first hurdle we didn't hesitate, eventually, to introduce several motors on the same machine, each motor having its particular function to perform and doing so in a far more satisfactory manner than could be done by transmitting the power through sliding spline shafts or such. Individual motor drives transformed machines into self-contained units and their locations in the room were not controlled by the location of the main lines, as heretofore. They could be, and were, moved and placed in the most convenient locations for lighting and working efficiency or for any other reasons.

Modern high speed cutting tools call for higher spindle speeds and the development of ball and roller bearings has met this situation, even on a precision

Right—A 1902 model bench lathe. Note the complex shafting and belting. Below is a 1939 model bench lathe, a complete unit with variable speed drive. The modern lathe must meet demands for increased precision, power, speed and operator's efficiency.



All Photos Courtesy Pratt & Whitney

tool room machine. Where a few years ago a manufacturing tolerance of .0004" runout in bearings was standard practice, "zero" bearings can now be obtained, making it practical to keep the runout of a spindle nose well within .0002" or even closer if required.

With the advent of these higher speeds, attention has also been given to lubrication, even if ball and roller bearings are used extensively. Pre-greased and pre-loaded bearings are working out very satisfactorily, and are in extensive use. Where periodical lubrication is required, oil reservoirs and pumps have replaced the numerous oil cups and oil cans which, in the past, were a very annoying matter to tool room and die shop superintendents and workers.

Lathes

In the past, 525 R.P.M. was considered the proper highest speed for, say, a 14" tool room lathe. This speed has now been stepped up to 1000 R.P.M. and even higher. The threaded spindle nose will not do at these high speeds, as a chuck or large face plate running at such speeds would unscrew and drop on the lathe "vees" if the brake were applied and the spindle stopped in the approved manner.

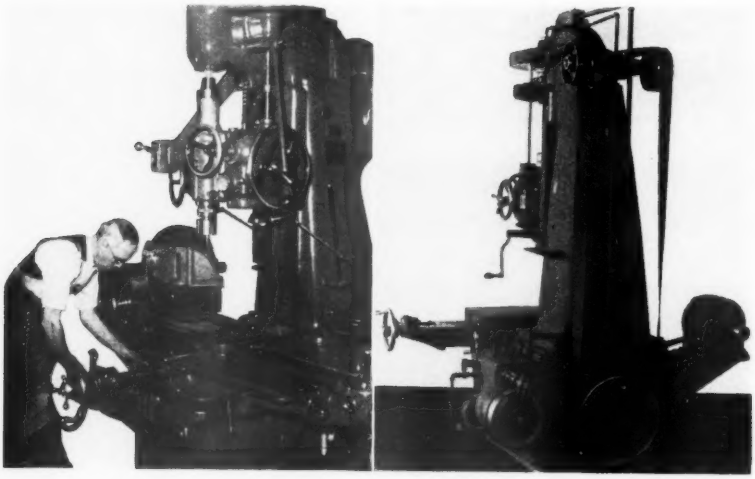
To meet this situation the new American Standard Cam-Lock Spindle Nose for turret, engine and bench lathes was developed, eliminating the threads and providing means in the form of cams and studs for clamping the chuck and face plate to the spindle nose. It made it more convenient to mount and remove the chucks and face plates than heretofore and made it perfectly safe to run at any speed required at this time or apt to be encountered in the future.

Convenient levers to engage the carriage feeds and cross slide have been substituted for the screw knobs. Convenient means have also been provided to tie the cross slide and taper bar together to compensate for unavoidable backlash in the conventional parts, making it feasible to cut, for example, a taper thread without any danger of tearing it.

Surface Grinders

Another development that has brought a real dollars and cents saving to users of machine tools is the improvement made in surface grinders. Modern surface grinders give the die maker a chance to prepare his die blanks and establish his working surfaces very expeditiously, and to sharpen the punch and die after hardening, and to grind the faces of forging dies.

The "mule" belt drive of the surface grinder of, say, 1905 was fair enough for



The development in jig borers has added immeasurably to both standards and technique in the tool room and die shop. The 30-year-old jig borer at the right with its obsolete "mule" drive and antiquated design cannot compete with the modern jig borer, whose accuracy is comparable to that obtainable in astronomical instruments.

its day, transmitting 7½ H.P. only; but the modern machine has a 30 H.P. motor and is direct coupled. The maximum surface speed of the reciprocating table in the old machine was 14 feet per minute—the new machine runs 100 feet per minute and the productivity per day and per wheel is more than doubled.

Jig Borers

At the present time there are very few holes bored in jigs by the "button" method, swinging the work up on the face plate of a lathe. This was a slow method and not over-accurate. The jig borer has taken its place, proving a great saver of time, with improved accuracy.

The various positions of the table and the work under the tool-carrying spindle are located with accurate end measures and micrometer heads. It is the same means that an inspector is apt to use when inspecting finished work and the operator should have tools fully as accurate as those of the inspector.

The worm and work gear of the rotary table are made very accurately, enabling the operator to space holes within a few seconds of arc—five seconds is about .0002″ on a 20″ diameter.

It is interesting to note that the aim of the engineers in charge of the building of the 200″ telescope on the West Coast is to produce an indexing mechanism within errors of five seconds of arc. It is very doubtful if this goal is to be reached, but, as they actually need a movement of 15 degrees only when making observations, they are planning to select and use the best section available.

In die and jig making, we are apt to use any part of the 360 degrees at any time, and it is a matter of satisfaction to know that means are available in toolrooms and die shops which are comparable in accuracy to that obtainable in astronomical instruments.

To locate a piece of work in the jig borer is only part of the job; good cutting tools are required to do good jig boring and tools tipped with tungsten carbide and other synthetic carbides have frequently proved very successful.

Lathe Collets

In order to use a reamer successfully, it must run true, and a new type of collet has been developed for that purpose. The regular lathe collet with its cylindrical bearing at the rear end does not run true enough as it must have a

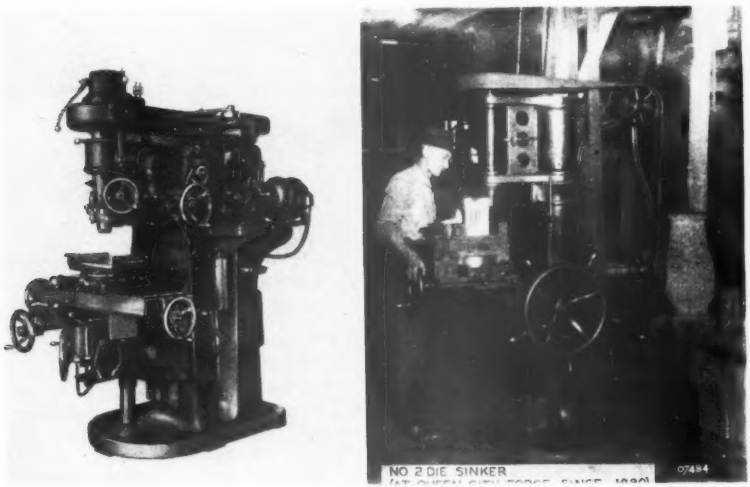
sliding fit at that point. At least one design of the new collet has been provided with double tapers, pinching the tool shank at the rear of the collet as well as at the front. The tool, when mounted in this collet, runs truer at a point 6" from the face of this collet than it does 2" beyond the face of a conventional lathe type spring collet.

Die Sinkers

Die sinkers have also undergone tremendous improvements. It took a very skilled die sinker to make a die for a crankshaft on the old machine, whereas, taking advantage of the power-operated oscillating head in the new type of machine, the semi-circular impression can be cut expeditiously. The oscillating head can be set to a predetermined radius and by using a taper cutter, the required draft will be produced, leaving the minimum amount of hand work. It also eliminates to a great extent the necessity for making hubs and special form cutters.

The tilting rotary vise with swivel top in the new machine enables the operator to set the work at compound angles according to his drawing, thereby eliminating many difficult set-ups. Die sinking cutters also have been improved in design and material; with the high spindle speeds now available cutters have an opportunity to work to full advantage.

Last, but not least, we must mention the remarkable gain that has been made in the accuracy of gages. This gain has been particularly important to modern industry where it is necessary to control interchangeable production. The Electrolimit Gage, made by my own company, is typical of the new "dial" gages. Not so many years ago, one division of the "dial" gage represented .001" and was thought to be very accurate. In more recent years, each division represented .0001". On the Electrolimit Gage dial, for example, each division is apt to represent .00001 part of an inch and we are still working within one division. This indicates very vividly the progress that is being made in fixture, tool and gage making and is one of the undisputed reasons why the tool maker and the die maker can build into tools, dies and machines the accuracy and long life required in modern high production industries to meet today's precision product demands.



The old die sinker, right, is nearly 50 years old—it required a very skillful operator, more set-ups and much more hand work than the new, modern die sinker. The present insistent demand for lower die building costs makes the die sinker, left, a factor in both obtaining jobs and in making them pay a profit.

Injection Molding of Plastics

By Jack Geers
Index Machinery Corporation

THE last four years have witnessed the greatest development in the plastic industry that has been recorded for a long time. Injection molding, although it has been used for many years in some parts of Europe, did not become of practical commercial value until recently.

The materials which were used in the earliest stages of the industry presented many problems which made this method of molding very difficult. However, with the development of more suitable thermo-plastic materials, the importance of injection molding rapidly asserted itself.

Injection molding machines, similar to the one shown below, were developed for the production of large castings. In the period of a few years, castings which had formerly been possible only in metal were being made in beautiful, colorful plastics.

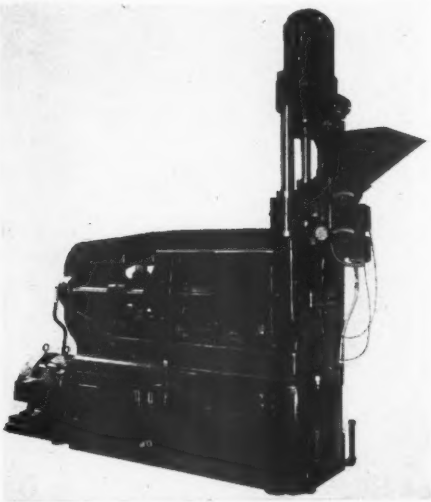
The process of injection molding may be easily understood if we look at it from the viewpoint of the basic principles involved. The process resolves itself into three operations:

1. The thermo-plastic material must be melted in a heating chamber.
2. The heated material must be forced into a cool mold.
3. The finished casting must be removed from the mold so that the cycle may be repeated.

The heating of the thermo-plastic material presents considerable difficulty due to the fact that thermo-plastic materials require very high temperatures to melt them, but at the same time they are very poor conductors of heat within themselves.

In order that this condition may be clearly understood, let us assume that we have a container of boiling hot water before us. If the hand is rapidly inserted and withdrawn from the container, our sense of touch will tell us that the water is warm but we will not be burned by the action because we did not leave the hand in the boiling water long enough for it to absorb the heat of the water.

The same condition exists in the heating chamber of the injection molding machine. The material does not have *(Cont. on Page 30)*



A fully-automatic Injection Molding Machine showing the sleeve type heating chamber, injection piston, pair of automatic temperature controls, hydraulic gages and the control panel.

Photo courtesy Index Machinery Corporation

Die Designing and Estimating

Advanced Series

IV

By GEORGE DANNES

George Dannes is superintendent and engineer of the Raffel Manfacturing Company of Chicago, and instructor in the advanced class studying Die Designing and Estimating at the Carl Schurz High School under the auspices of the Chicago District of the Special Tool, Die and Machine Shop Institute.

In last month's installment Mr. Dannes tabulated related die making operations and required accessories into six groups: A—Machining, B—Holes, C—Layout, D—Work on Die, E—Accessories, F—Assembling, Development, Tryout. He established that "The time consumed for squaring a block is in direct relation to the time for grinding it, because both time values are dependent on the size and proportions of the block. They should, therefore, be established simultaneously, regardless of how far apart the operations actually are when the die is being made."

From time values for the various operations obtained from actual studies in different shops, the author worked out a decimal table with which to compute the time required for machining and grinding die blocks of various dimensions. A die whose parts conformed with the following specifications was used for estimating the time required for machining and grinding the die, punch, punch plate and stripper and the results were entered on an estimating form which is reproduced herewith so that the reader may continue the record of time required for subsequent operations.

The Editor

ESTIMATING TIME FOR DRILLING, ETC.—GROUP B

DRILLING, reaming and tapping may be considered quite ordinary operations. Much information on the subject is accessible but it is well to remind ourselves that time is consumed not only in the actual drilling operation but likewise in establishing accurate hole locations and transferring them to associated parts. Time is also required to select drills, reamers and taps of the required sizes. The adjoining table (Fig. 7) of time values is developed to include the time required to set up for and actually perform the operation. It is to be used for estimating all hole operations excepting those for perforators and pilots.

Size	Drill	Drill-Ream or Ct. Bore	Drill-Ream and Ct. Bore	Drill and Tap
1/8-3/8	.1	.1	.1	.1
3/8-1/2	.1	.1	.2	.2
3/8-3/4	.1	.2	.2	.3
3/8-1"	.2	.2	.2	.3

ABOVE VALUES ARE FOR HOLE DEPTHS UP TO 1½".
FROM 1½" TO 3" DEEP USE 200%.
FROM 3" TO 5" DEEP USE 400%.

NOTE: SETUP TIME FOR ANY GROUP OF HOLES ADD TO ABOVE —.1 HR. FOR EACH SETUP.

FOR DRILLING IN H.C.-H.C. STEEL ADD 25% TO TOTAL OF HOLES.

Fig. 7

It will be noted that the figures in the table take into consideration hole-depths

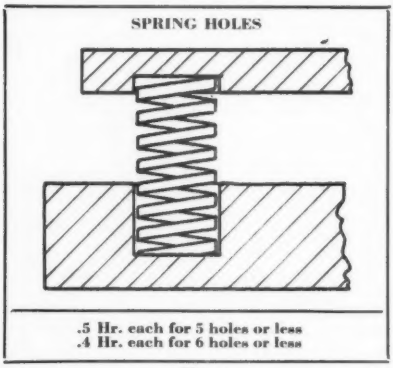


Fig. 8

to the maximum of 1½". They must be increased in accordance with instructions when depths exceed this figure. It is also important that an additional .1 hour be included for setup time for any group of holes. Thus to drill three $\frac{5}{16}$" holes in one setting .3 hour should be allowed for the actual operation plus .1 hour for setting up, a total .4 of an hour. If six $\frac{5}{16}$" holes are to be drilled in one setting .7 of an hour would be the correct time.

Fig. 8 indicates time values to be used for drilling and counter boring spring holes in two different materials as for example used in the stripper and die shoe of a compound die. The die which has been already described requires four screws and two dowel holes in a die block. The size of this block indicates that no hole needs to be larger in diameter than ⅜" and according to the table in Fig. 7 it requires .1 hour per hole regardless of whether the holes are to be merely drilled or reamed, tapped or counter bored in addition. Now record under B in Fig. 5 opposite Die .7 which represents .1 of an hour for setting up for the six holes and .6 of an hour for total operations on them. Because there must be four holes for screws and two for dowels in the punch plate .7 hour is recorded in the same column opposite Punch Plate. The stripper being mounted with the same screws and dowels likewise requires six holes and .7 is entered opposite Stripper. The same drilling must be done in the die shoe to mount the die and the stripper and in the punch holder for mounting the punch pad, therefore .7 is to be entered opposite each of those parts in column B. The time required for drilling, reaming and tapping or counter boring of all screw and dowel holes entered in column B, totals 3.5 hours.

ESTIMATING TIME FOR LAYOUT AND INSPECTION GROUP C

The two tables (Fig. 9 and 10) to be used for estimating the time required for design layout and inspection of die parts should be very carefully studied and thoroughly understood because the time values in column D for actual machining of die parts are directly dependent upon them.

"C" LAYOUT TIME	
Units	Description
1	STRAIGHT LINES
2	ANGULAR LINES
1	ADDITIONAL ANGULAR LINES RUNNING PARALLEL
3	CURVED LINES WHICH CANNOT BE BORED
2	CIRCULAR CURVES ALSO PERFORATORS—PILOTS, ETC.
NOTE: EACH UNIT = .1 HR.	
WHEN MAKING TEMPLATE EACH UNIT = .6 HR.	
DO NOT COUNT RADII BELOW ¼".	
NO LAYOUT TIME FOR SQUARE OR ROUND BLOCKS.	
ADD 50% WHEN TOLERANCES ARE CLOSER THEN ± .002".	

Fig. 9

A mistake made in column C values will directly affect the figures in D and result in incorrect time values there and a distorted final estimate. The method which has been developed divides each die part into its contour characteristics, the time for the design and layout of which are in direct relation to the time required for machining them. These contour characteristics in turn enable us to establish the units of time required to lay out the die parts which are recorded in column C and likewise their machining in column D.

Let us now examine a piece part according to its contour characteristics or description as indicated in Fig. 9. (Fig. 1

INSPECTION TIME. ADD TO LAYOUT TIME.	
TOLERANCE	HRS.
± .005	.5
± .0025	1.0
± .0015	1.5
± .001	2.0

Fig. 10

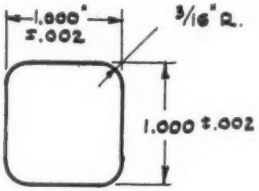


Fig. 1

Fig. 1 is reproduced from February issue, Fig. 5, with Group A data from March issue.

MACHINE OPERATIONS

ALL DIE PARTS	A	B	C	D	E	F
DIE	.6 .8	.7	.4			
PUNCH	.3 .5					
PUNCH PLATE	.4 .3	.7				
STRIPPER	.4 .3	.7				
DIE SHOE		.7				
PUNCH HOLDER		7				
STOP						
INSPECTION			1.9			
TRYOUT						
TOTAL	3.6	3.5	2.3			

Fig. 5

is reproduced as an example.) We find that its contour consists of four straight lines and four radii under ¼". Only the four straight lines will be considered because the table eliminates consideration of radii under ¼", thus we have in this particular instance a total of four time-units. Each time-unit in column C consists of .1 hour, thus .4 hour is the time allowed for laying out the contour of the die opening in the die block. Enter this .4 opposite Die.

If it is necessary to make a hardened template of a product part, the outline of which has to be transferred to the die block, the table in Fig. 9 specifies .6 hour for each time unit. Thus for the 4 the total time would be 2.4 hours. After the die opening has been made the contour of the punch and the openings in the punch pad, stripper and die shoe can be readily determined and their outlines transferred. Continuing downward in column C we therefore make no entries until we come to Inspection.

The periods of time required for inspection of the various die parts during their machining processes are closely related to the shape of the part itself and the tolerances which are specified. In other words, the more complex the die opening is and the closer the specifications of tolerances, the oftener machine operation has to be interrupted for checking and inspection. Fig. 10 is a table of units of time based upon various tolerances to which must be added die layout time. Thus, if the specified tolerance of our die part is plus or minus .002", inspection time would be 1.5 hours, plus the die layout time of .4 hour or a total of 1.9 hours. This is the figure to be entered in column C opposite Inspection. The total for the column is 2.3 hours for both Layout and Inspection.

Now let us forget for a moment the die estimating job and return to the table in Fig. 9 for additional explanation. Any straight line in the contour of a die part as well as its continuation, either horizontal or vertical, is considered 1 unit. A contour line which is at an angle to such a straight line and its continuation is considered 2 units. An angular contour line running parallel to another such angular line which has

already been counted has the value of only 1 unit. Curved contour lines which

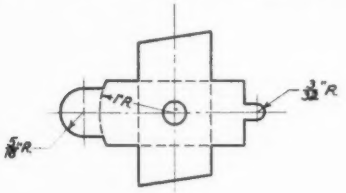


Fig. 11

cannot be bored are valued at 3 units. On the other hand, a circular contour such as a perforator hole and an inside radius which can be drilled or bored has a value of 2 units.

Radii which are smaller than ¼" are not taken into consideration at all. There will be an explanation for this in the next chapter. There is also no layout time figured for bringing square or round blocks to size but be sure to add 50% to the layout time if the tolerance is closer than plus or minus .002".

Fig. 11 illustrates a die part which was chosen because it has all of the contour characteristics listed in the table in Fig. 9. How it may be segregated into the unit values is shown in Fig. 12. Note that the method involves merely a few pencil lines. Beginning at A we have first the 4 straight lines which make up 4 units. At B we add 2 units for the angular line on top plus 1 unit for the line running parallel to it. The total is now 7 units. At C we add 3 more units for the 1 vertical and the 2 horizontal lines, again omitting any value for the radius because it is smaller than ¼". The total is now 10 units. At D another 3 units is added for the curved line and at E 4 units, 2 being for the straight line and 2 for the radii which in this case are larger than ¼". The total of 17 units is the correct answer to the problem.

The reader should practice to become proficient in assigning these unit values to die parts of various shapes. It is not difficult.

The next installment will deal with the values for Group D—the time required for removing the material for a die opening, machining the punch and clearance holes in stripper and die shoe.

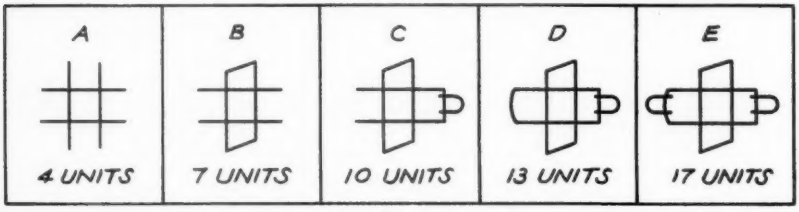


Fig. 12

EDITOR'S NOTE: In the past few weeks we have had more requests for back issues containing earlier installments of Mr. Dannes' series than we could take care of. We regret this. Since the articles are successively built on those preceding, it is important that the series be kept complete as published. We urge readers to keep their copies intact month by month to avoid such breaks in continuity. It is quite possible that Mr. Dannes' series will be reprinted later in book form as a companion volume to Mr. Bohmer's book.

An English Point of View

"There is ample evidence to show that while the machine may be taking the place of unskilled and semiskilled labor, there is no diminution, but rather the reverse, of the need for highly skilled workers, and the demands on our technical institutions for the necessary training will rise in quality and not decrease in quantity." —*Kenneth Lindsey, parliamentary secretary to the Board of Education.*

Our Readers Were Right About This Important New Book —

Die Designing and Estimating

by

Charles Bohmer

Our readers urged us to make the articles by Charles Bohmer on "Die Designing and Estimating", published serially in Tool · Die · Machine PROGRESS available in book form.

We agreed that such publication would not only put the concise, authoritative material on dies and die work in much more convenient form, but that, since Mr. Bohmer's presentation was based on a successful teaching method, the material should be in demand by technical and trade schools, technical men in production and allied industries, as well as by apprentices and young shop workers. One friendly executive pointed out that many experienced die men, anxious to keep abreast of new ideas and methods, would find it worthwhile to keep such a book handy.

So we agreed to publish the book.

OUR READERS WERE RIGHT!

Over 30 per cent of the first printing was sold before the book came from the press!

Orders came singly, by twos, fives, twenties and more — sight unseen. They came not only from sources we had hoped they would come from but from manufacturers, shops and individuals we had no reason to believe were more than remotely interested.

In appreciation of this reception, we are maintaining the pre-publication price of one dollar ($1.00) per copy, postpaid, until the remainder of the shop edition is exhausted.

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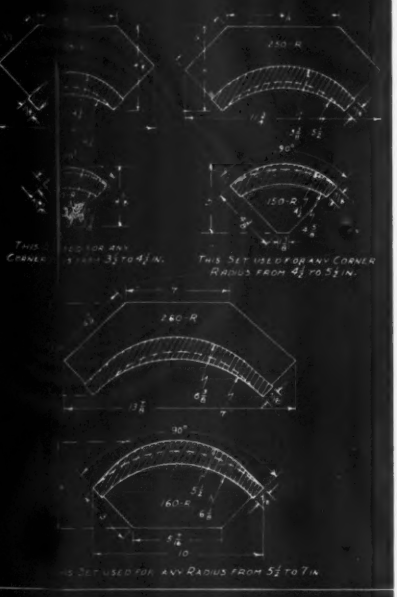

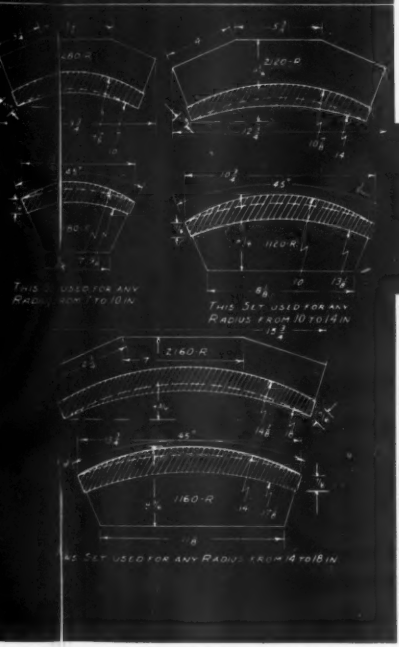

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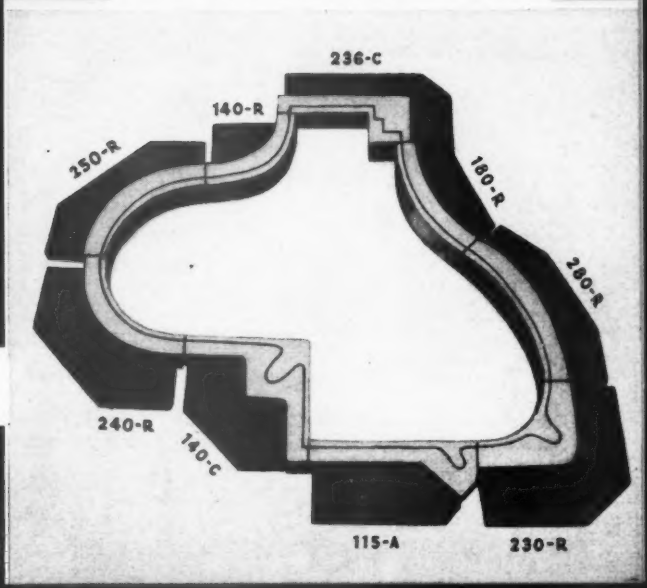
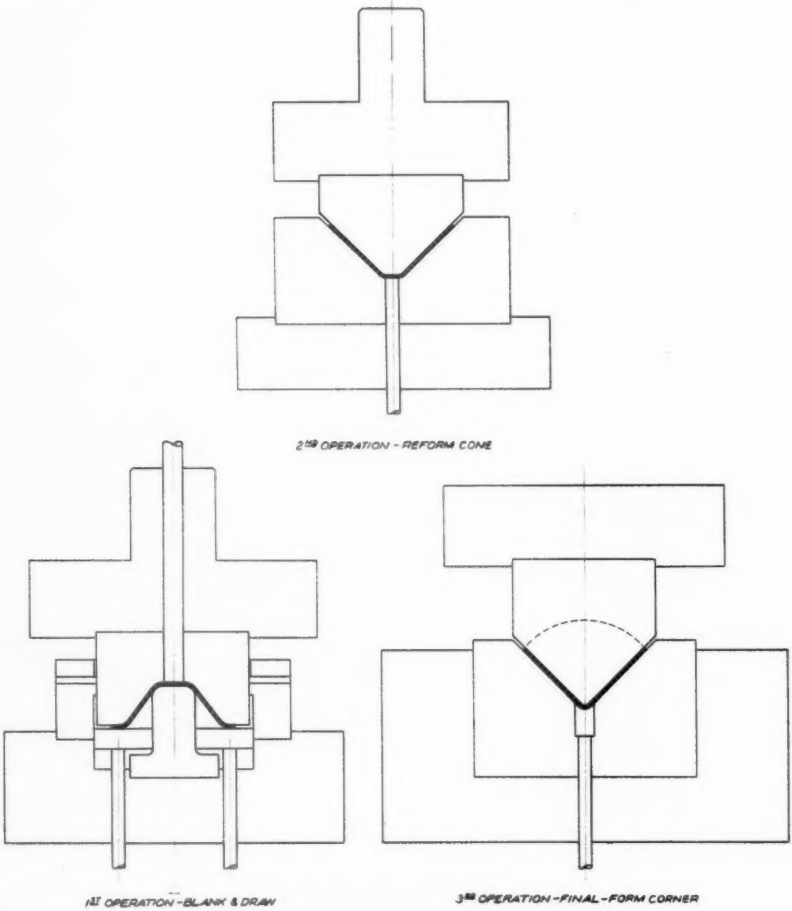


Shop Kinks

This Department, created by the interest of our readers, will be a regular feature of T·D·M PROGRESS. Readers are invited to send their "pet" shop hint or kink to the Editor.

Making a 3″ Stamped Corner of Heavy Gage Metal

A METAL stamping frequently seen in commercial applications is the common corner—a three sided pressed metal product made in various designs, finishes and metals. Its most common application is in conjunction with trunks, traveling bags, cabinets, etc., where the corner sections are exposed to some



abuse in the field and consequently it is desirable to both reinforce, preserve, and give a finished appearance to the corners of the particular product in question.

The accompanying sketches illustrate a C.R.S. corner of No. 16 U.S.S. Gage with a 3" radius on all three sides, and the dies employed to produce it. This stamping was used on the four corners of a large air conditioning cabinet.

6" Round Blank Used

It might be interesting to note that when this job was given preliminary study, from all appearances it seemed as if it might be necessary to trim the three sides in order to obtain the required 3" radius, or the development of a "blank" of suitable shape, which after processing would satisfy the requirements. Development showed that a perfectly round blank, approximately 6" in diameter, would produce a corner with a 3" radius and 90 degrees on a side. (This radius was within $\frac{1}{32}$" of being perfect which, incidentally, was satisfactory for the job considering all factors involved; that is, no trimming, the gage and size of the job.)

The tools used are shown diagrammatically and are of conventional design. The first operation (combination Blank and Draw) consists of drawing a shallow cone with sufficient material at its apex to compensate for the stretch in the second and third operation calling for a sharp corner. The essential parts of the die are hardened tool steel and mounted in a commercial die set. Strip stock was employed.

The second operation (reforming the cone) consists of restriking to form a sharper angle at the apex and straightening the sides. Here, too, the punch and die are made of tool steel and hardened. This operation was run in a press of 75 ton capacity.

The third or final operation consists of finish forming the corner. The die is nested to a considerable depth in the cast iron shoe to prevent splitting due to the heavy side thrust. This operation was performed in a 150 ton geared press.

N. M. Olney, Products Engineer, National Seal Company, Inc., Brooklyn, N. Y.

The NEW Boyar-Schultz HEAVY DUTY Profile Grinder No. 2

"... a 'natural' for our difficult work." "Just what we have been looking for." "When can we get one?" Many such comments were heard at the A. S. T. E. Show in Detroit.

This new HIGH SPEED Machine Tool was designed for Tool and Die work of larger and heavier types. It is a time saver in grinding and fitting all kinds of irregular shapes and difficult contours and profiles that under the old methods of hand filing and stoning consume so many costly hours.

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A New Goddard End Mill for Die Work

AFTER a thorough try-out in die shops, Goddard and Goddard Co., Inc., milling cutter engineers and manufacturers, announce a new end mill developed particularly for more economical milling of dies. It is built on the inserted serrated blade principle which provides for ready adjustment of blades to give long grinding life and also permits the use of one blade for a large variety of cutter sizes.

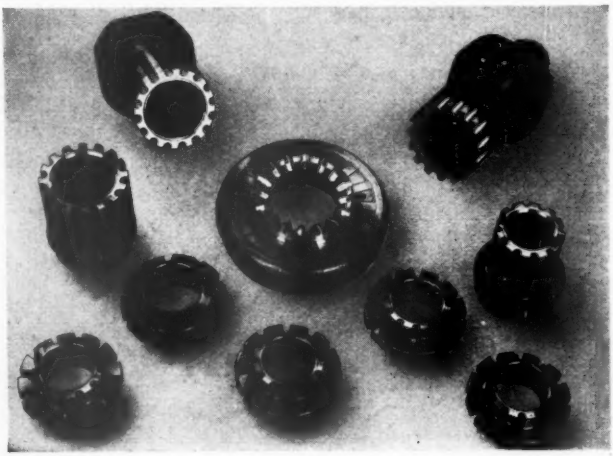
A blade length of 2 inches has been made standard and end mills are built up in increments of these 2 inch flute lengths, resulting in a marked economy to the user. Two sizes of blades likewise cover a wide range of cutter sizes —from 3½" to 8" diameters. End mills up to 5" diameter use a ⅜" x 1" x 2" blade; 6" and larger, a ½" x 1 5/16" x 2". Due to their radial adjustability by means of serrations, blades have a long grinding life. The ⅜" blade is adjusted to give ⅜" life, a *total* grinding life of ¾" on the tool diameter, while the ½" blade gives 5/16" life per blade or 1⅛" total on its diameter.

The cutting edges of this new end mill form continuous spirals. Each blade is flat on the front and back surfaces and it sets into a short straight slot. This provides a flat metal-to-metal backing for the blade. This is true also of the front of the blade with its wedge contact. Since the serrated surface gives an additional bearing area, as compared to a plain surface, this end mill can take severe punishment.

An idea of its stamina may be had from the performance of one of these milling cutters in a large Detroit plant. It was a tool with 4" diameter x 16" length of cut, with a No. 7 Morse shank in use on a die sinking machine. Operating at high speed, it removed ¾" of nickel cast iron on a cut 14" long. After increasing the feed far beyond what any other tool had been able to stand, this performance resulted in a purchase order.

The body of this new Go & Go end mill is made of an alloy steel, heat treated for toughness and strength.

Additional descriptive and performance data and prices may be had by writing Goddard and Goddard Company, Inc., Detroit, Michigan.



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FCC Appoints Allegheny Ludlum in Toledo Territory

Kenneth L. Clark, vice-president and general manager of the Forging and Casting Corporation of Detroit, announces the Forging and Casting line will hereafter be stocked and sold in the Toledo territory by the new branch office of the Allegheny Ludlum Steel Corporation, located at 201 East First Street, Toledo, O. Kenneth T. French is the local manager. Allegheny Ludlum will carry in their new warehouse, in addition to the Forging and Casting line, a complete line of tool steels. Mr. French's business phone number is Taylor 3571; Sunday and holidays, Walbridge 5181.

New Boyar-Schultz Grinder

THE new Boyar-Schultz Heavy Duty Profile Grinder, designed to perform on tools, dies and machine parts of the larger and more difficult types, is sturdily designed, balanced for smooth running even on heavy work with large wheels; has 20" x 18" table with accurate vertical movement of 4" and that can be tilted up to 10 degrees either way from horizontal; spindle oscillation of $\frac{3}{16}$" which may be applied or cut out by a simple lever action and a T-slot for holding diamond dresser runs from center to right-hand back corner permitting dresser to be left on the table for a large variety of work.

The Heavy Duty Profile Grinder is a rapid stock remover, even with small diameter wheels. It saves hours on grinding and fitting difficult contours and irregular shapes. Grinding, the builder states, is not only faster but better than hand work, providing a smoother ground surface The profile grinder is a precision machine tool but much of the "run of the shop" grinding done on ordinary emery wheels can also be done on it better and in less time. Standard equipment includes special wheel dresser with diamond, safety guard for dressing wheels, 3 mounted wheels, table ring insert and wrenches.

A new leaflet "Heavy Duty Precision Profile Grinder No. 2" is ready for distribution. For your copy write Boyar-Schultz Corporation, 2112 Walnut Street, Chicago, Ill.

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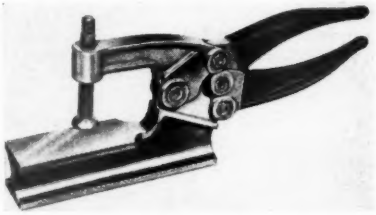
The Knu-Lok Plier-Parallel Meets with Approval

INTRODUCED originally as a precision tool for toolmakers, inspectors, etc., the Knu-Lok Plier-Parallel is similar to this manufacturer's toggle action pliers except that a hardened, ground and square base has been substituted. The accuracy, within .0005", is comparable to parallels already on the market.

This new plier-parallel is a self-contained clamping unit and may therefore be incorporated directly into the design of a fixture. In some instances it is desirable that the base be left soft to permit drilling and fastening to a base plate. Such bases are optional.

With the introduction of the Knu-Lok Plier-Parallel there came an insistent immediate demand from jig and fixture builders.

An interesting fact developed in tooling for the manufacture of the plier-



parallels themselves is that considerable economies were made by using them for drilling the holes in the handle and jaws.

Knu-Lok Plier-Parallels may be and often are manually applied. They automatically lock into position, hold positively but release instantly when required; will not walk and are quickly adjustable to various thicknesses.

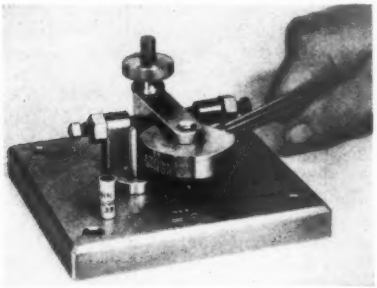
For full information, write the manufacturer, Knu-Vise Products Company, Inc., 6432 Cass Avenue, Detroit, Michigan. Ask for Knu-Lok Plier-Parallel Data TD-41.

Bates Introduces New Hand Marking Machine

A HAND marking machine, No. 929, newly developed by H. O. Bates, rolls a mark into metal ferrules, rings, tubes and other cylindrical or tubular

When you order or write about products described in TDM PROGRESS please mention the publication.

parts made of steel, brass, aluminum, nickel, silver, gold, celluloid or bakelite materials. In operation the part is rotated so that the entire circumference of 1¼" and the height of ½" may be marked. Special adaptation or construction can be made for marking larger surfaces. Operation is very simple—the part to be marked is dropped onto the



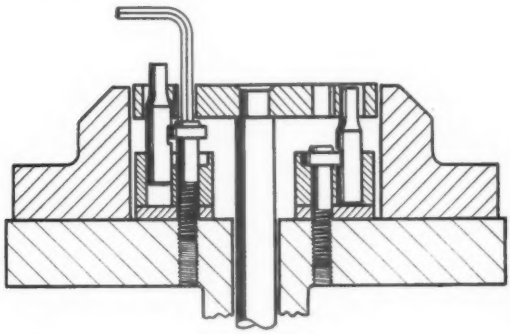
arbor and the marking accomplished by a simple swing of the lever. The arbor is furnished in various interchangeable sizes. The standard machine requires a hole of ⅛" or more in the center of the tube or part, depending on the hardness of the material to be marked. The wall can be any thickness within the limit of the machine. For marking solid cylindrical pieces the part is dropped against two rollers which allow it to rotate as the marking die impresses the mark. When bolted to a bench or table the average operator can readily mark thirty or more pieces per minute.

For full information of the No. 929 Hand Marking Machine, write H. O. Bates, 251-259 North Broad Street, Elizabeth, N. J.

McKenna Names Strickland Detroit Representative

McKenna Metals Co., Latrobe, Pa., manufacturers of Kennametal tools and blanks for steel and metal cutting, has opened a branch office in Detroit in charge of Elwin M. Strickland, 142 Lothrop Bldg., 7376 Grand River Ave. For many years, Mr. Strickland was a diamond tool manufacturer in Detroit. He will be in charge of selling Kennametal blanks to tool makers.

. . . *Punches Changed in One Minute!*



Punch being jacked out of retainer by screw head

Punch locked in place with screw head

Reverse the interlocking socket head screw and you automatically eject the punch. ONLY Hovis Screwlock Retainers have this remarkable time-saving feature.

Write for NEW catalog describing complete line of punches, button dies and retainers.

HOVIS SCREWLOCK COMPANY

3129 Larned St., East Detroit, Mich.

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Injection Molding of Plastics

(Continued from Page 16)

the same temperature as the chamber itself, but attains a temperature somewhat lower. The actual temperature reached is directly dependent upon the temperature of the chamber and the time the plastic material is in contact with it.

When the material is forced into the mold it is necessary that it be in a plastic condition or it will not fill out the cavities of the mold. On the other hand, if the material becomes too hot it will burn and cause the castings to flash. It will also produce a bad finish on the castings.

Following the above analysis it is easily understood that for the successful injection of thermo-plastic materials, the cycle of operation of the injection molding machine must be kept as constant as possible. In all cases where it is possible, the design of the mold should be such that the castings will be automatically ejected from the mold when the machine opens. In cases where inserts are employed the time for loading the inserts into the mold should be accurately established so that the human factor is eliminated as much as possible.

The time spent in more carefully designing the molds for the injection molding of thermo-plastic materials will easily pay for itself when these molds are placed in actual production.

With the completion of a good design for the mold, the success of the job is by no means assured. The finish on the injection molded part will of course be no better than the finish of the mold in which the part is made. The high pressures employed in injection molding will cause the slightest scratches on the face of the mold to be reproduced on the finished casting. This necessitates extreme care in polishing the cavities of the mold.

The gates or runners in a multiple cavity mold must be highly polished so that no interference is offered to the flow of material into the cavities. Experience has proven that the finish on these channels will have a marked effect upon the finished casting.

The molds must be properly vented so that the air can escape when the plastic material is injected into the mold. This venting may sometimes be accomplished through the knockout mechanism of the die or, in the cases where cores are used, the air may escape back through the core pins.

This rather brief survey of the injection molding industry's advancement in recent years readily shows that the development has resulted not from one line of effort alone, but rather, from the cooperation of the material manufacturers who are continually developing new and better materials, the machine manufacturers who are building larger and better machines, the designers of molds who are constantly striving to make molds which will produce complicated parts with the least possible difficulty, and the tool makers who by their care in construction of the molds assure the perfect performance of them when they are put into production.

38,000 R. P. M.
½ H. P.

FASTER, MORE POWERFUL
E-1 GRINDER
AIR TURBINE DRIVE

Fast, smooth grinding is accomplished with the E-1 Grinder because of its exceptional speed and power. Weighing less than 5 lbs. it handles easily for rough-out or fine finishing. No parts to wear out. Automatic lubrication. A real craftsman's tool.

Write for Descriptive Bulletin

ONSRUD MACHINE WORKS, Inc.
3914 Palmer St. Chicago, Illinois

When you order or write about products described in TDM PROGRESS please mention the publication.

Porter Steel Moves into Larger Quarters

FOR the second time in two years the officers of The George H. Porter Steel Treating Company find it necessary to increase the plant's facilities.

A new heat treating furnace with an inside working length of 12 feet 6 inches and inside width and height of 60 and 36 inches respectively is being installed. It will be oil fired and completely automatic in operation. Of particular interest to users of heat treating service are the new Porter oil quenching tanks. There are two, measuring respectively 12 and 24 feet in length. Both have a new system of automatic controls for maintaining uniform quenching temperatures.

Less than two years ago the company installed a Cyclone draw furnace and two Lindberg pot type furnaces with automatic controls, also a Bellevue gas fired furnace. Later in that year a 200-ton Watson-Stillman hydraulic straightening press and a Wheelabrator unit for the abrasive blasting of castings, forgings and similar products were installed.

The new plant consists of three complete buildings served by a tramrail system. Building No. 1 has in it special equipment for tool, die and small commercial work, also housing the office; No. 2 is for large commercial work and No. 3 holds the Lindberg furnaces, straightening presses and abrasive blasting equipment.

It is expected that the company will occupy its new plant about April 15. New equipment is now being installed and removal from the former plant will be accomplished without interruption of service. The active officers and personnel of the company continue as previously: President, J. D. Myers; Vice-President, C. L. Porter; Secretary and General Manager, George H. Porter III. John J. Walker also continues in charge of all tool and die work.

The George H. Porter Steel Treating Company distributes a copyrighted Hardness Conversion Chart. It will be mailed to all who address Department TD, The George H. Porter Steel Treating Company, 1271 East 55th Street, Cleveland, O.

DE-STA-CO ARBOR SPACERS

They save time in setting up cutters on milling machines and other tools. Will help you get work out quicker. Low in cost, but high in savings. Standard stock sizes from .001" to .125" thick. Also specials up to 4.000".

TRIAL ASSORTMENT

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Price list No. 70 sent free

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3443 Fort St., West Detroit, Mich.

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Mac-its

1. Switch to Mac-its for accurate fit, longer life.
2. Wherever ordinary screws break, strip or mushroom, use Mac-its to cut costs in the long run.
3. Design for compactness, for savings on material and production, by taking advantage of Mac-its' extra strength in smaller sizes.

Get details and prices from your Mac-it distributor, or write for Catalog 38.

The Strong, Carlisle & Hammond Co.
1392 West Third St. Cleveland, Ohio

When you order or write about products described in TDM PROGRESS please mention the publication.

KENNAMETAL
Turns STAINLESS STEEL CASTING to Size IN ONE CUT

KENNAMETAL-tipped tools produced an accurate surface on this 18" diameter stainless steel casting in one cut. This is typical of the successful performances which are gaining KENNAMETAL repeat orders and a reputation for reliability and efficiency. Harder than the hardest tool steel, yet unusually strong, it will machine steel heat-treated up to 500 Brinell, as well as softer metals. Write today for catalogue showing how to braze your own tools with KENNAMETAL blanks.

McKENNA METALS Co
500 LLOYD AVENUE
LATROBE, PENNSYLVANIA, U.S.A.

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In Die Sets [we have the lowest prices], Composite Die Sections, Accessories and Cerromatrix.

A complete die supply line includ ing Die Sets, Compression Springs, Dowel and Leader Pins, Guide Bushings, Mac-its Hollow Head Screws, Stripper Bolts, Composite Die Sections and Cerromatrix.

Catalogs on request.
Send us your requisitions.

DIE SUPPLY COMPANY
CHerry 6818
2059 Hamilton Ave. Cleveland, O.

Automatic Punch Ejection New Feature Hovis Retainers

STAMPING manufacturers use standardized retainers and punches for two principal reasons: 1. Standardized punches are less expensive to buy and they may be bought as required. 2. It has been widely advertised that such punches can be quickly removed from standardized retainers and replacement punches inserted without the use of special tools by skilled labor and when this can be done successfully it unquestionably is a time-saving factor.

Changing punches of the old type is an expensive procedure because it requires a skilled mechanic to replace a punch without damaging the die and the press run is interrupted for a longer period. If the die is in a progressive line-up, the flow of finished parts stops completely.

Heretofore interchangeable mechanisms have made it possible to remove a punch but no means which would *eject* the punch have ever been incorporated in them. A large percentage of dies in use today have spring strippers and these must be disassembled to enable an operator to take hold of a punch with pliers to remove it, even after the retainer mechanism has released it. Much of the advantage of using the interchangeable type has not been realized. Even in compound dies it happens that punches do not come out easily because of corrosion or dirt accumulation and such a die frequently has to be partially disassembled to remove a so-called "quick change" punch.

The Hovis punch-retaining mechanism is the head of a screw interlocked into a notch in the side of the punch. A slight change in the screw head made recently now makes the screw effective in both directions; in other words, a reversal of the interlocking operation, with a standard hexagon socket head screw wrench, not only releases the punch, but a continuation of the motion also jacks the punch out of the retainer hole, thus ejecting it from behind a spring stripper to the point where the end of it protrudes far enough through the stripper to take hold of and remove without dismantling the stripper.

(Continued on Page 37)

When you order or write about products described in TDM PROGRESS please mention the publication.

Buy With Confidence

ABRASIVE PAPER AND CLOTH
Carborundum Co., Niagara Falls, N. Y.

AIR CONDITIONING APPARATUS
Buffalo Forge Co., 477 Broadway, Buffalo, N. Y.

ASSEMBLING MACHINES—Automatic
Sommer & Adams Co., The, 18511 Euclid Ave., Cleveland, Ohio.

BARS—Rolled Composite
Forging and Casting Corp., Ferndale (Detroit), Michigan.

BEARINGS—Ball, Roller and Thrust
Ohio Ball Bearing Co., 6531 Euclid Avenue, Cleveland, Ohio.

BENDING MACHINES—Special
McKinney Tool & Mfg. Co., The, 1688 Arabella Rd., Cleveland, Ohio.

BENDING MACHINES—Angle Iron
Buffalo Forge Co., 477 Broadway, Buffalo, N. Y.

BOLTS—Stripper
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.
Die Supply Co., 2059 Hamilton Ave., Cleveland, Ohio.

BORING BARS
Eclipse Counterbore Co., 7428 St. Aubin Ave., Detroit, Michigan.

BUSHINGS—Die
Acme Industrial Co., 206 No. Laflin St., Chicago, Ill.
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.
Die Supply Co., 2059 Hamilton Ave., Cleveland, Ohio.

BUSHINGS—Drill Jig
Acme Industrial Co., 206 No. Laflin St., Chicago, Ill.

CARBIDE ALLOY TOOLS and BLANKS
McKenna Metals Co., 500 Lloyd Ave., Latrobe, Pa.

CASTINGS— Nitri-Cast-Iron, Air and Oil Hardening Tool Steel Cast to Shape
Forgings & Casting Corp., The, Ferndale (Detroit), Mich.

CHROME PLATING—Dies and Machine Parts, New and Worn
Master Chrome Service, Inc., 5611 Herman Ave., N.W., Cleveland, Ohio.

CLAMPS—Die
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.

● This directory of products lists for ready reference the names of manufacturers and dealers whose sales to Tool·Die·Machine PROGRESS readers have established them as dependable in every sense of the word. They merit your consideration.

● Complete information about any product may be had upon request made to the firm listed or to us.

● Your mention of Tool·Die·Machine PROGRESS will be appreciated.

CLAMPS—Toggle
Detroit Stamping Co., 3443 West Fort St., Detroit, Mich.
Knu-Vise Products Co., Inc., 6433 Cass Ave., Detroit, Michigan.

CONTOUR METAL-WORKING MACHINES
Continental Machine Specialties, 1301 S. Washington Ave., Minneapolis, Minn.

COUNTERBORES
Eclipse Counterbore Co., 7428 St. Aubin Ave., Detroit, Mich.
Putnam Tool Co., 2985 Charlevoix Ave., Detroit, Mich.

CRANKSHAFTS—Heat Treated for Presses
Enterprise Machine Parts Corp., 3731 Jerome Ave., Detroit, Mich.

CUT-OFF WHEELS
Carborundum Co., Niagara Falls, N. Y.

CUTTERS—Die-sinking
Eclipse Counterbore Co., 7428 St. Aubin Ave., Detroit, Mich.

CUTTERS—Milling
Goddard & Goddard Company, Inc., 12278 Burt Road, Detroit, Mich.
Putnam Tool Co., 2985 Charlevoix, Detroit, Mich.

CUTTERS—Multi Diameter
Eclipse Counterbore Co., 7428 St. Aubin Ave., Detroit, Mich.

CUTTING MACHINES—Hand & Power
Buffalo Forge Co., 477 Broadway, Buffalo, N. Y.

DE-MAGNETIZER
Arlavox Mfg. Co., 428 So. Green St., Chicago, Ill.

DIAMOND STONES
Carborundum Co., Niagara Falls, N. Y.

DIAMOND WHEELS
Carborundum Co., Niagara Falls, N. Y.

DIE CASTING MACHINES
Phoenix Machine Co., The, W. 28th and Church Sts., Cleveland, Ohio.
Reed-Prentice Corp., Worcester, Mass.

DIE MAKERS SUPPLIES
Acme Industrial Co., 206 No. Laflin St., Chicago, Ill.
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.
F. C. Danneman Co., 203-205 Lafayette St., New York, N. Y.
Die Supply Co., 2059 Hamilton Ave., Cleveland, Ohio.

DIE MAKING MACHINES
Continental Machine Specialties, Inc., 1301 Wash. Ave., Minneapolis, Minn.
Grob Brothers, Grafton, Wis.

DIE SECTIONS—Composite Steel
Die Supply Co., 2059 Hamilton Ave., Cleveland, Ohio.
Forging and Casting Corp., Ferndale (Detroit), Michigan.

DIE SECTIONS—Forged
Ajax Steel and Forge Co., 305 Adair St., Detroit, Mich.

DIE SETS
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.
F. C. Danneman Co., 203-205 Lafayette St., New York, N. Y.
Die Supply Co., 2059 Hamilton Ave., Cleveland, Ohio.

DIE SINKING MACHINES
Reed-Prentice Corp., Worcester, Mass.

DOWEL PINS
Acme Industrial Co., 206 No. Laflin St., Chicago, Ill.
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.
Die Supply Co., 2059 Hamilton Ave., Cleveland, Ohio.

DRESSING STICKS
Carborundum Co., Niagara Falls, N. Y.
DRILLING MACHINES—Automatic
Sommer & Adams Co., The, 18511 Euclid Ave., Cleveland, Ohio.
DRILL JIG—Toggle Action
Knu-Vise Products Co., Inc., 6433 Cass Ave., Detroit, Michigan.
DRILL JIG—Universal
Hartford Special Machinery Co., Hartford, Conn.
DRILL JIG BUSHINGS
Acme Industrial Co., 206 No. Laflin St., Chicago, Ill.
DRILL PRESSES—Single & Multiple Spindle
Buffalo Forge Co., 477 Broadway, Buffalo, N. Y.
ELEVATING TABLES—Portable
Hamilton Tool Co., The, 222 North B Street, Hamilton, Ohio.
END MILLS
Progressive Tool & Cutter Co., Ferndale, Michigan.
Putnam Tool Co., 2985 Charlevoix, Detroit, Mich.
EXTRACTOR—Broken Tap
The Walton Co., 88 Allyn St., Hartford, Conn.
FILES—Hand
Grobet File Corp. of America, 3 Park Place, New York, N. Y.
FILES—Rotary
Grobet File Corp. of America, 3 Park Place, New York, N. Y.
Hamilton Tool Co., The, 222 North B Street, Hamilton, Ohio.
FILING MACHINES—Continuous
Continental Machine Specialties, Inc., 1303 Washington Ave., S., Minneapolis, Minn.
Grob Brothers, Grafton, Wis.
FORGINGS—General
Ajax Steel & Forge Co., 205 Adair St., Detroit, Mich.
FORGINGS—Water and Oil Hardening, High Speed, Special Alloy, Stainless and S.A.E. Steel
Forging and Casting Corp., Ferndale (Detroit), Michigan.
GAGES—Spring Stop
Knu-Vise Products Co., Inc., 6433 Cass Ave., Detroit, Michigan.
GAGE BLOCKS
Ford Motor Co., Johansson Div., Dearborn, Mich.
GEARS—Special—14 to 96 D.P.—Made to Order Only
Gear Specialties, Inc., 2640 W. Medill Ave., Chicago, Ill.
GRINDER—Portable Pneumatic
Onsrud Machine Works, Inc., 3914 Palmer St., Chicago, Ill.
GRINDER—Precision for Contours
Baker Brothers, Inc., Toledo, Ohio.
Boyar-Schultz Corp., 2114 Walnut Street, Chicago, Ill.
Kostelin Tool & Die Corp., 3401 Humboldt Ave., Detroit, Mich.
GRINDING & LAPPING — Precision
Acme Industrial Co., 206 No. Laflin St., Chicago, Ill.
GRINDING WHEELS
Carborundum Company, The, Niagara Falls, New York.
GUIDE PINS
Acme Industrial Co., 206 No. Laflin St., Chicago, Ill.
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.
HACK SAW SHARPENING
Machinists Tool Grinding Co., 2836 W. Lake St., Chicago, Ill.
HONING STICKS
Carborundum Co., Niagara Falls, N. Y.
JIG BORING—Contract
Kiffer Tool & Die Co., 5601 Tillman Ave., Cleveland, Ohio.
Swiss Boring Co., 3918 Vermont Ave., Detroit Mich
JIG BORING TOOLS
Eclipse Counterbore Co., 7428 St. Aubin Ave., Detroit, Michigan.
LAPS—Copper Head Expansion
Boyar-Schultz, Inc., 2114 Walnut Street, Chicago, Ill.
LAPPING COMPOUND
Carborundum Co., Niagara Falls, N. Y.
LAPPING MACHINES
Schraner & Co., A. P., 3338 Payne Ave., Cleveland, Ohio.
LEADER PINS
Acme Industrial Co., 206 No. Laflin St., Chicago, Ill.
Die Supply Co., 2059 Hamilton Ave., Cleveland, Ohio.
MACHINE BASES—Fabricated
Die Supply Co., 2059 Hamilton Ave., Cleveland, Ohio.
MACHINE REBUILDING
Enterprise Machine Parts Corp., 2731 Jerome Avenue, Detroit, Mich.
MAGNETIC SINE TABLE
Omer E. Robbins Co., 637 Mt. Elliott Ave., Detroit, Mich.
MILLING MACHINES—Vertical
Reed-Prentice Corp., Worcester, Mass.
MILLING MACHINES—Continuous
Sommer & Adams Co., The, 18511 Euclid Ave., Cleveland, Ohio.
MOLDING MACHINES—Plastic
Reed-Prentice Corp., Worcester, Mass.
NUMBERING DEVICES
H. O. Bates, 251-257 North Broad St., Elizabeth, N. J.
PARALLELS
Ford Motor Co., Johansson Div., Dearborn, Mich.
POLISHING & BUFFING MACHINES—Automatic Continuous
Sommer & Adams Co., The, 18511 Euclid Ave., Cleveland Ohio.
POLISHING GRAIN—
Carborundum Co., Niagara Falls, N. Y.
PUNCHES—Hand, Toggle Action
Knu-Vise Products Co., Inc., 6433 Cass Ave., Detroit, Michigan.
PUNCHES—Standard & Interchangeable
Hovis Screwlock Co., 3129 Larned St., E., Detroit, Mich.
RACKS—For Bar Stock and Pipe
Wm. S. Yohe, 500 Mahoning Ave., Canton, Ohio.
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Putnam Tool Co., 2985 Charlevoix Ave., Detroit, Mich.
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ROLLER DIE FORMING MACHINES
McKinney Tool & Mfg. Co., The, 1688 Arabella Rd., Cleveland, Ohio.

SALVAGE—Tool-Die & Machine Parts
Master Chrome Service, Inc., 5611 Herman Ave., N.W., Cleveland, Ohio.

SAND BLASTING
Porter Steel Treating Co., The Geo. H., 1225 Marquette St., Cleveland, Ohio.

SAW & SHEAR CUT-OFF MACH.—Automatic
McKinney Tool & Mfg. Co., The, 1688 Arabella Rd., Cleveland, Ohio.

SAWING MACHINES—Continuous
Continental Machine Specialties, Inc., 1303 So. Washington St., Minneapolis, Minn.

SAWING MACHINES—Open End
Grob Brothers, Grafton, Wis.

SCREW MACHINE PRODUCTS—Contract
Star Machine & Tool Co., 9220 Woodland Ave., Cleveland, Ohio.
Ulmer Co., The J. C., 1791 East 38th St., Cleveland, Ohio.

SCREW MACHINE PRODUCTS—Hardened & Ground
Acme Industrial Co., 206 No. Laflin St., Chicago, Illinois.

SCREWS—Socket Head
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.
Die Supply Co., 2059 Hamilton Ave., Cleveland, Ohio.
Strong, Carlisle & Hammond Co., 1392 West Third St., Cleveland, Ohio.

SCREWS—Transfer
Nielsen Tool & Die Company, 1859 Gardner Ave., Berkley, Michigan.

SCRIBERS
Ford Motor Co., Johansson Div., Dearborn, Mich.

SHARPENING STONES
Carborundum Co., Niagara Falls, N. Y.

SHEARS—Bolt & Rivet—Automatic
Buffalo Forge Co., 477 Broadway, Buffalo, N. Y.

SINE BARS
Ford Motor Co., Johansson Div., Dearborn, Mich.

SPACERS—For Milling Machine Arbors
Detroit Stamping Co., 3443 West Fort St., Detroit, Mich.

SPACING FIXTURES
Hartford Special Machinery Co., Hartford, Conn.

SPRING MAKING MACHINERY
Sleeper & Hartley, Inc., Worcester, Massachusetts.

SPRINGS—Die
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.
Die Supply Co., 2059 Hamilton Ave., Cleveland, Ohio.

STAMPINGS
Barth Stamping & Mach. Works, W. 24th & Denison, Cleveland, Ohio.
Davis Tool & Engineering Co., 6461 Epworth Blvd., Detroit, Mich.
Denning Mfg. Co., The, 1775-81 E. 87th St., Cleveland, Ohio.
Detroit Stamping Co., 3443 West Fort St., Detroit, Mich.
Modern Tool & Die Co., P. O. Box 2741, Cleveland, Ohio.
Rockford Die & Tool Wks., Inc., 1816 Seventeenth St., Rockford, Ill.
Star Machine & Tool Co., 9220 Woodland Ave., Cleveland, Ohio.
Star Tool & Die Works, 2522 24th St., Detroit, Mich.
Ulmer Co., The J. C., 1791 East 38th
Variety Machine & Stamping Co., The, 12605 Elmwood Ave., Cleveland, Ohio.
St., Cleveland, Ohio.

STAMPS—Steel
H. O. Bates, 251-257 North Broad St., Elizabeth, N. J.

STEEL—Alloy
Columbia Tool Steel Co., 410 East 14th St., Chicago Heights, Ill.
Darwin & Milner, Inc., 1258-64 West Fourth Street, Cleveland, Ohio
William Jessop & Sons, Inc., 121 Varick St., New York, N. Y.
Wheelock-Lovejoy & Co., Inc., 130 Sidney St., Cambridge, Mass.

STEEL—Carbon
Columbia Tool Steel Co., 410 East 14th St., Chicago Heights, Ill.
Darwin & Milner, Inc., 1258-64 West Fourth Street, Cleveland, Ohio
William Jessop & Sons, Inc., 121 Varick St., New York, N. Y.

STEEL—Chromium
Darwin & Milner, Inc., 1258-64 West Fourth St., Cleveland Ohio.

STEEL—"Cobalt"
Darwin & Milner, Inc., 1258-64 West 4th St., Cleveland, Ohio.

STEEL—High Speed
Ajax Steel & Forge Co., 205 Adair St., Detroit, Mich.
Columbia Tool Steel Co., 410 East 14th Street, Chicago Heights, Ill.
Darwin & Milner, Inc., 1258-64 West 4th St., Cleveland, Ohio.
William Jessop & Sons, Inc., 121 Varick St., New York, N. Y.

STEEL—Stainless
Ajax Steel & Forge Co., 205 Adair St., Detroit, Mich.

STEEL—Tool & Die
Columbia Tool Steel Co., 410 E. 14th St., Chicago Heights, Ill.
Darwin & Milner, Inc., 1258-64 West 4th St., Cleveland, Ohio.
William Jessop & Sons, Inc., 121 Varick St., New York, N. Y.
Wheelock-Lovejoy & Co., Inc., 130 Sidney St., Cambridge, Mass.

STEEL PLATE—Ground
Die Supply Co., 2059 Hamilton Ave., Cleveland, Ohio.

STEEL PLATE—Rough or Machined Torch Cut Shapes
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.

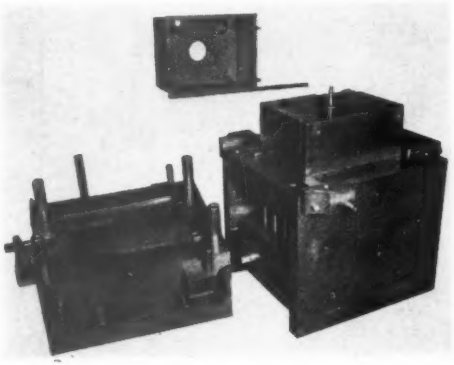
Die Casting Die Service

is a specialty with us.

The die shown cast the aluminum box (above) which is approximately 18" square and weighs 11 pounds. This is typical of die casting dies we are designing and building regularly.

We build special machines and precision machine parts. We are equipped to do a wide variety of work including larger planer service.

We design and build Sheet Metal and Die Casting Dies, Tools, Jigs, Fixtures and Special Production Machinery.



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Representatives:

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125 Barclay St., New York, N. Y.

NEFF-KOHLBUSH & BISSELL
2225 W. Madison St., Chicago, Ill.

When you order or write about products described in TDM PROGRESS please mention the publication.

Die Supply Co., 2059 Hamilton Ave., Cleveland, Ohio.

STEEL TREATING—Hardening
Porter Steel Treating Co., The Geo. H., 1235 Marquette St., Cleveland, Ohio.

STRAIGHT EDGES
Ford Motor Co., Johansson Div., Dearborn, Mass.

STRAIGHTENING MACHINES
Buffalo Forge Co., 477 Broadway, Buffalo, N. Y.

TAP EXTRACTOR
The Walton Co., 88 Allyn St., Hartford, Conn.

TAPPER—Precision
The Master Tapper Co., 2 Main St., Belleville, N. J.

TAPPING MACHINES
Buffalo Forge Co., 477 Broadway, Buffalo, N. Y.

TAPPING MACHINES—Tool Room
The Master Tapper Co., 2 Main St., Belleville, N. J.

TOOLS AND DIES—Carbeloy
Kiffer Tool & Die Co., 5401 Tillman Ave., Cleveland, Ohio.

TOOLS—Cemented Carbide Tipped
Eclipse Counterbore Co., 7435 St. Aubin Ave., Detroit, Mich.

TOOL CHESTS
Gerstner Tool Chests, 54 Columbia St., Dayton, Ohio.

TRANSFER SCREWS
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TRANSMISSION UNITS
Ohio Ball Bearing Co., 6531 Euclid Avenue, Cleveland Ohio.

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Bissett Steel Co., The, 947 E. 67th St., Cleveland, Ohio.

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VENTILATING APPARATUS
Buffalo Forge Co., 477 Broadway, Buffalo, N. Y.

WASHERS—Special
Detroit Stamping Co., 8448 West Fort St., Detroit, Mich.

WELDING
Danly Machine Specialties, Inc., 2121 So. 52nd Ave., Chicago, Ill.
Overly-Hautz Co., 1617 West 116th St., Cleveland, Ohio.
Star Tool & Die Works, 2522 24th St., Detroit, Mich.

WELDING PLIERS
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DANNEMAN *Precision* DIE-SETS

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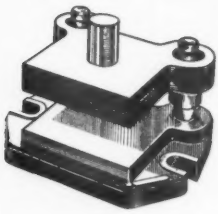

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Time is one of the important elements in the replacement of a machine part in such an emergency. Therefore work on it had to go forward day and night. Delivery was made in two weeks, ten days after delivery of the forging. This constitutes unusual service when the crankshaft specifications are taken into consideration. Made of Empco crankshaft steel, the forging weighed approximately 2 tons. It measured about 110 inches in length, had a pin diameter of 10 inches and a throw of 6 inches.

Information about Empco crankshafts and Enterprise machine rebuilding service, also a catalog of machine repair parts, may be had by addressing Enterprise Machine Parts Corporation, Jerome Avenue at McNichols Road, Detroit, Michigan.

Hovis Automatic Punch Ejection

(Continued from Page 32)

It has been demonstrated with this new ejection feature, that a Hovis punch can be removed from a compound die, a new punch inserted and locked into place and the die again ready for operation in approximately one minute.

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Years of built-in low cost service . . . A necessity in Tool Room and Die Shops.

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Move heavy dies, jigs and fixtures more quickly, economically and safely *with the*

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The Hamilton Portable Elevating Table

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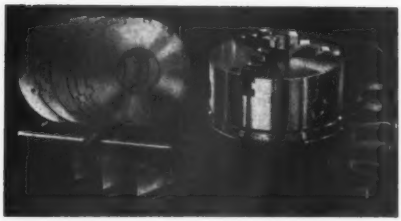

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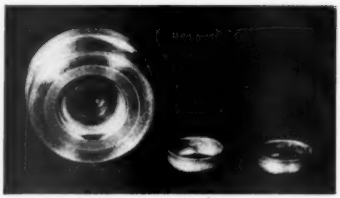
Carbide Die Inserts Give Long Economical Runs

A NEW hard carbide insert for dies used in stamping and drawing automobile parts, chair casters, bottle caps, cans, electrical appliances and similar products is, it is stated, outlasting ordinary tool steel dies many times. The carbide, Kennametal, stamped out 70,000 chair casters before the first regrind, five times the 14,000 pieces produced by the best tool steel die used previously. The die illustrated has stamped out 11,000 casters without any visible sign of wear. Kennametal is now generally accepted as a material for machine tool tips.

Kennametal is not a tungsten carbide. Its basis ingredient is a newly discovered



intermetallic compound, tungsten-titanium carbide. The most interesting feature of Kennametal from a machining point of view is that it does not have any affinity for ferrous metals. When machining speeds are above a minimum of usually 100 surface feet per minute, the tool does not crater above the cutting edge. This results in a greatly increased tool life. In die work the tip does not tend to "pick up". Kennametal was developed to machine steels or materials with a steel

(Continued on Page 42)

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Over 5 Generations of Service—1774-1939

A renowned Tool Steel every user knows.

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All leading ball and roller thrust bearings, banded as shown or without band and using steel or bronze retainers. Also all types of ball and roller bearings and transmission equipment.

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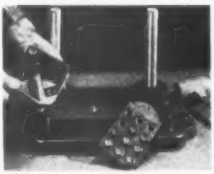
ELIZABETH, N. J.

NIELSEN TRANSFER SCREWS

Locate drill holes perfectly and quickly



Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time of other methods and eliminate spoilage.

7 Sizes · Inexpensive · Last for years · *Write for circular*

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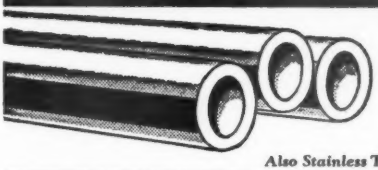
OIL HARDENING TOOL STEEL TUBING



Substantially reduces labor costs by eliminating the expensive procedure of drilling from the solid.
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Controlled temperatures and atmospheres are used exclusively in manufacturing all Columbia Tool Steels.

These new methods have resulted in new standards of perfection and accuracy of duplication.

It pays to use Good Tool steel.

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Precision Tool Room Tapping SAVES TIME—TAPS—TROUBLE

Eliminate waste of valuable time by highly paid skilled men, attempting to tap hole accurately by hand.

Capacity 6-32 to ⅞"

Send for circular

The Master Tapper Co.
6 Main St. Belleville, N. J.

(Continued from Page 40)

or semi-steel type of chip and as it machines steel heat-treated up to 500 Brinell while combining roughing and finishing in one operation and machines softer metals, it is said to have a much wider range of cutting applications than any hard carbide.

Specification sheets on Kennametal milling tests and production records as well as general catalog No. 2 are available on request to McKenna Metals Co., Latrobe, Penna.

New Grobet Rotary Files Ground from the Solid

The Grobet File Corp. of America announces a complete line of rotary files ground from the solid has been added recently to its regular line of hand cut rotary files and milled cut rotary files. The rotary files are ground from the solid after hardening and are made of super high speed steel. The principal advantage of these files is that they can be re-sharpened many times at a low cost.

For copy of Catalog G-44, write Grobet File Corp. of America, 3 Park Place, New York, N. Y.

Arlavox Demagnetizer Began in Tool Room

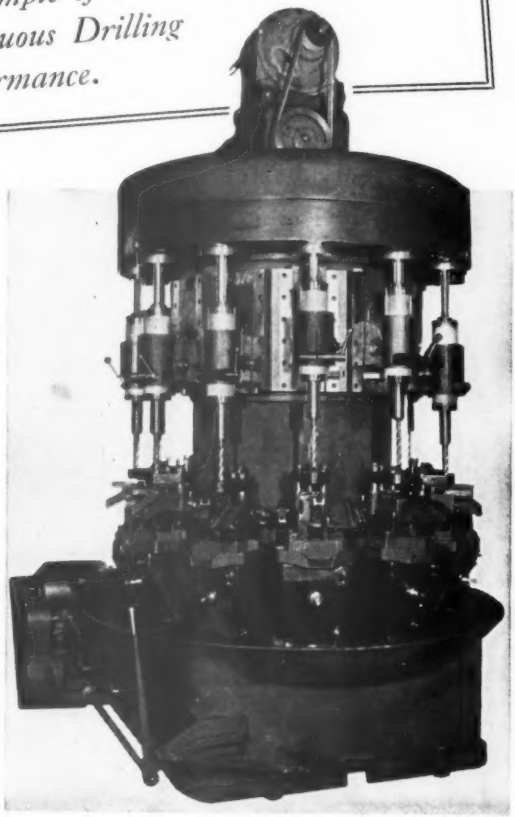
THE first Arlavox Demagnetizer was built for use in the Arlavox tool room. Machinery salesmen persuaded the company to make it available for the tool and die shops. The Arlavox Demagnetizer is of the transformer type, thoroughly impregnated with special compound. It draws 10 amperes of current sufficient to handle dies up to five inches in thickness, making it suitable for demagnetizing deep drawing dies as well as blanking dies. Every part is oversized for heavy duty and years of service.

Bulletins on the Arlavox Demagnetizer are available on request from Arlavox Manufacturing Company, 428 South Green Street, Chicago, Illinois.

When you order or write about products described in TDM PROGRESS please mention the publication.

1600-¾" HOLES PER HOUR
THROUGH ⅞" STEEL

is one actual example of this Sommer and Adams Standard Continuous Drilling Machine's performance.



★ Its 12 drilling stations are equipped with automatic clamping and ejection fixtures.

Rocker arms, connecting rods, tappets, gear shift yokes and gear blanks are a few of the products which it handles with ease.

It is a standard machine with us and can be readily adapted to many production drilling jobs.

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TOOLS • JIGS • GAGES • FIXTURES

Automatic Machines for Continuous Milling, Drilling, Polishing

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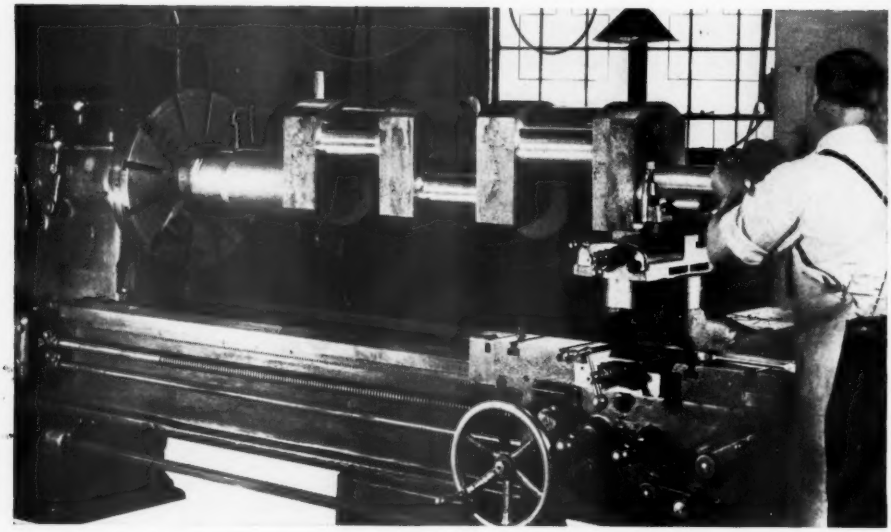
EMERGENCY SERVICE ON EMPCO Crankshafts..



A double-throw Empco Crankshaft being machined on one of our lathes—weight, 2 tons; length, 110 inches; pin diameter, 10 inches; throw, 6 inches. Delivery 10 days after making of forging; total time, 2 weeks. Smaller crankshafts needed in emergencies, delivery one week.

A power press breakdown is a serious matter for most stamping plants. Delay in getting a press back into service is costly and can have far-reaching production results. Every day counts and we know how to "reduce" the days of machine idleness. Our facilities have been developed to meet the urgency of your needs. Our prices will show noteworthy savings over those of other supply sources. Let us prove it.

Empco Crankshaft Steel

Here is a steel that takes punishment standing up. It is alloyed of the purest base metals, melted, poured and forged under expert supervision, to achieve the highest physical properties. Scientific heat treatment brings out all the rugged qualities of this fine steel.

Forgings of EMPCO Crankshaft Steel normalize at 1650° with a Brinell hardness of 228-241 and have a tensile strength of 110,000. EMPCO Crankshafts are heated to 1550°, quenched and drawn to 900°, attaining a Brinell hardness of 269 to 300 and a tensile strength of 145,000 to 165,000 lbs. per square inch.

Overnight service on machine repair parts

Stock catalog on request

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